

What is claimed is:

1. A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

5 an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the
10 vertebra without penetrating any bone portion of the vertebra.

2. The prosthesis of claim 1 wherein the fixation mechanism is further adapted and configured to attach to a lamina portion of the vertebra.

15 3. The prosthesis of claim 2 wherein the fixation mechanism is further adapted and configured to attach to the lamina portion of the vertebra substantially at a spinous process location.

20 4. The prosthesis of claim 3 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

25 5. The prosthesis of claim 4 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on four surfaces of the lamina portion of the vertebra.

30 6. The prosthesis of claim 1 wherein the fixation mechanism is further adapted and configured to attach the artificial facet joint element to the vertebra without blocking access to a pedicle portion of the vertebra.

35 7. The prosthesis of claim 1 wherein the fixation mechanism is further adapted and configured to be in contact with an attachment portion of the vertebra on at least two opposing sides of the attachment portion of the

vertebra.

8. The prosthesis of claim 7 wherein the fixation mechanism is further adapted and configured to be in contact with the attachment portion of the vertebra on
5 four surfaces of the attachment portion of the vertebra.

9. The prosthesis of claim 1 wherein the fixation mechanism comprises first and second vertebra contact surfaces, the distance between the first and second vertebra contact surfaces being adjustable.

10 10. The prosthesis of claim 1 wherein the fixation mechanism comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being movable with
15 respect to the other vertebral contact component.

11. The prosthesis of claim 1 further comprising an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism.

20 12. The prosthesis of claim 11 wherein the attachment mechanism traverses a midline of the vertebra.

13. The prosthesis of claim 11 wherein the attachment mechanism is a screw.

25 14. The prosthesis of claim 11 wherein the fixation mechanism is a first fixation mechanism and wherein the attachment mechanism is adapted and configured to penetrate a bone portion of the vertebra to form a second fixation mechanism attaching the artificial bearing element to the vertebra.

30 15. The prosthesis of claim 11 wherein the attachment mechanism disposes the artificial facet joint bearing element caudad from the fixation mechanism.

35 16. The prosthesis of claim 11 wherein the attachment mechanism is adapted and configured such that the artificial facet joint bearing element is movable in a cephalad or caudad direction with respect to the

fixation mechanism.

17. The prosthesis of claim 16 wherein the attachment element comprises a location element movable in a cephalad or caudad direction with respect to the fixation mechanism.

18. The prosthesis of claim 17 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

19. The prosthesis of claim 18 wherein the right and left artificial facet joint bearing elements are attached to the attachment element.

20. The prosthesis of claim 1 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

21. The prosthesis of claim 20 further comprising right and left attachment elements attaching the right and left artificial facet joint bearing elements to the fixation mechanism.

22. The prosthesis of claim 1 wherein the fixation mechanism comprises a clamp.

23. The prosthesis of claim 1 wherein the fixation mechanism is a first fixation mechanism, the prosthesis comprising a second fixation mechanism adapted and configured to penetrate a bone portion of the vertebra to attach the artificial bearing element to the vertebra.

24. A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis

comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint; and

5 means for affixing the artificial facet joint bearing element to the vertebra without penetrating any bone portion of the vertebra.

25. The prosthesis of claim 24 wherein the means for affixing comprises a clamp.

10 26. The prosthesis of claim 25 wherein the means for affixing comprises first and second components movable with respect to each other.

27. The prosthesis of claim 24 wherein the means for affixing comprises means for affixing the artificial
15 facet joint bearing element to a lamina portion of the vertebra.

28. The prosthesis of claim 24 further comprising means for moving the artificial facet joint bearing element in cephalad and caudad directions with respect to
20 the means for affixing.

29. The prosthesis of claim 24 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the
25 prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint, the means for affixing comprising means for affixing the right and left artificial facet joint bearing elements to the
30 vertebra.

30. The prosthesis of claim 29 further comprising means for moving the right and left artificial facet joint bearing elements in cephalad and caudad directions with respect to the means for affixing.

35 31. The prosthesis of claim 30 wherein the means

for moving comprises a rod.

32. The prosthesis of claim 30 wherein the means for moving comprises right and left fasteners attaching the right and left artificial facet joint bearing
5 elements, respectively, to the means for affixing.

33. The prosthesis of claim 24 further comprising means for affixing the artificial facet joint bearing element to the vertebra by penetrating a bone portion of the vertebra.

10 34. A prosthesis to replace right and left cephalad portions of right and left natural facet joints on a vertebra, the prosthesis comprising:

right and left artificial facet joint bearing elements adapted and configured to replace the cephalad
15 portions of the right and left natural facet joints; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to a lamina portion of the vertebra without penetrating any bone portion of the vertebra.

20 35. The prosthesis of claim 34 further comprising an attachment mechanism attaching the right and left artificial facet joint bearing elements to the fixation mechanism.

25 36. The prosthesis of claim 35 wherein the attachment mechanism is adapted and configured to move the right and left artificial joint bearing elements in a cephalad or caudad direction with respect to the fixation mechanism.

30 37. The prosthesis of claim 35 wherein the attachment mechanism comprises a rod.

38. The prosthesis of claim 35 wherein the attachment mechanism comprises right and left fasteners for the right and left artificial facet joint bearing elements, respectively.

35 39. A prosthesis to replace a cephalad portion of

a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the
5 natural facet joint; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra, the fixation mechanism comprising a non-invasive support member adapted and configured to attach
10 to a lamina portion of the vertebra.

40. The prosthesis of claim 39 wherein the support member is further adapted and configured to attach to the lamina portion of the vertebra substantially at a spinous process location.

15 41. The prosthesis of claim 40 wherein the support member is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

20 42. The prosthesis of claim 41 wherein the support member is further adapted and configured to be in contact with the lamina portion of the vertebra on four surfaces of the lamina portion of the vertebra.

25 43. The prosthesis of claim 39 wherein the fixation mechanism is further adapted and configured to attach the artificial facet joint element to the vertebra without blocking access to a pedicle portion of the vertebra.

30 44. The prosthesis of claim 39 wherein the support member comprises first and second vertebra contact surfaces, the distance between the first and second vertebra contact surfaces being adjustable.

35 45. The prosthesis of claim 39 wherein the support member comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and

second vertebral contact components being movable with respect to the other vertebral contact component.

46. The prosthesis of claim 39 further comprising an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism.

47. The prosthesis of claim 46 wherein the attachment mechanism traverses a midline of the vertebra.

48. The prosthesis of claim 46 wherein the attachment mechanism is a screw.

49. The prosthesis of claim 46 wherein the attachment mechanism disposes the artificial facet joint bearing element caudad from the fixation mechanism.

50. The prosthesis of claim 46 wherein the attachment mechanism is adapted and configured such that the artificial facet joint bearing element is movable in a cephalad or caudad direction with respect to the fixation mechanism.

51. The prosthesis of claim 50 wherein the attachment element comprises a location element movable in a cephalad or caudad direction with respect to the fixation mechanism.

52. The prosthesis of claim 51 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

53. The prosthesis of claim 52 wherein the right and left artificial facet joint bearing elements are attached to the attachment element.

54. The prosthesis of claim 39 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the

prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

55. The prosthesis of claim 54 further comprising
5 right and left attachment elements attaching the right and left artificial facet joint bearing elements to the fixation mechanism.

56. The prosthesis of claim 39 wherein the fixation mechanism comprises a clamp.

10 57. A method for implanting a cephalad facet joint prosthesis on a vertebra, the method comprising the steps of:

affixing a fixation mechanism to the vertebra without penetrating any bone portion of the vertebra; and
15 disposing an artificial facet joint bearing element extending from the fixation mechanism in a predetermined position with respect to the vertebra.

58. The method of claim 57 wherein the affixing step comprises affixing the fixation mechanism to a
20 lamina portion of the vertebra.

59. The method of claim 57 wherein the affixing step comprises affixing the fixation mechanism to a lamina portion of the vertebra substantially at a spinous process position of the vertebra.

25 60. The method of claim 59 further comprising the step of removing the spinous process prior to the affixing step.

61. The method of claim 57 wherein the affixing step comprises placing a fixation mechanism in contact
30 with an attachment portion of the vertebra on at least two opposing sides of the attachment portion of the vertebra.

62. The method of claim 61 wherein the affixing step comprises placing the fixation mechanism in contact
35 with the attachment portion of the vertebra on four

surfaces of the attachment portion of the vertebra.

63. The method of claim 61 wherein the fixation mechanism comprises first and second vertebral contact components, the affixing step comprising moving one of
5 the first and second vertebral contact components with respect to the other.

64. The method of claim 63 wherein the affixing step further comprises preventing relative movement between the first and second vertebral contact components
10 after the moving step.

65. The method of claim 57 wherein the affixing step comprises affixing a fixation mechanism to the vertebra without blocking access to a pedicle portion of the vertebra.

15 66. The method of claim 57 further comprising fastening the artificial facet joint bearing element to the fixation mechanism.

67. The method of claim 66 wherein the fastening step comprises inserting a fastener through the fixation
20 element.

68. The method of claim 67 wherein the inserting step comprises inserting the fastener through the fixation element across a midline of the vertebra.

69. The method of claim 67 wherein the fastener is
25 a screw.

70. The method of claim 57 wherein the fixation mechanism is a first fixation mechanism, the method further comprising affixing a second fixation mechanism to the vertebra by penetrating the vertebra.

30 71. The method of claim 70 wherein the step of affixing a second fixation mechanism comprises attaching the second fixation mechanism to the first fixation mechanism.

72. The method of claim 71 wherein the step of
35 attaching the second fixation mechanism comprises

inserting a fastener into the vertebra.

73. The method of claim 72 wherein the step of inserting a fastener comprises inserting a fastener into a lamina portion of the vertebra.

5 74. The method of claim 72 wherein the inserting step comprises inserting the fastener through the fixation element across a midline of the vertebra.

75. The method of claim 72 further comprising attaching the artificial facet joint bearing element to
10 the fastener.

76. The method of claim 57 wherein the disposing step comprises moving the artificial facet joint bearing element in a cephalad or caudad direction with respect to the vertebra.

15 77. The method of claim 57 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element, the disposing step further comprising disposing a left artificial facet joint bearing element in a predetermined position with respect
20 to the vertebra.